

REMARKS/ARGUMENTS

In the January 8, 2008 Office Action, the Examiner rejected claims 15-23 pending in the application. This response asks for reconsideration of pending claims 15-23 in light of the following remarks.

Claims 15, 17, 19-21, and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Liu et al., U.S. Patent No. 5,720,845 (hereafter “Liu”) in view of Maloney et al., U.S. Patent No. 7,029,382 (hereafter “Maloney”), as applied in the Examiner’s rejection filed November 27, 2006. In that rejection, the Examiner stated that Liu discloses a workpiece carrier including an integrated pressure control system, the workpiece carrier comprising; a carrier housing (including part 62), a workpiece platter (38) coupled to the housing, the workpiece bladder having a surface configured to press against a surface of a workpiece; and at least one pressure transducer (29) mounted to the carrier housing while controlling pressure provided to the workpiece bladder. See Fig. 3, column 3, lines 39-end.” Although the Examiner conceded that Liu does not disclose a rotary union for connecting electrical lines, an air supply line, and an air exhaust line to the pressure control system, the Examiner contended that Maloney discloses that it is well known in the art to provide a rotary union mounted to a workpiece carrier for communicating stationary supply sources/lines external to the carrier with the carrier in locations on the carrier by allowing the sources/lines to pass therethrough. Therefore, the Examiner stated that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Liu apparatus by providing a rotary union mounted to the workpiece carrier for connecting electrical lines, an air supply line, and an air exhaust line to the pressure control system by allowing the lines to pass therethrough as taught by Maloney. Applicant respectfully disagrees.

As previously argued by Applicant, Maloney fails to disclose a rotary union mounted to a workpiece carrier for controlling pressure provided to a workpiece bladder and/or a plurality of pressurizable zones. Instead, Maloney discloses a rotary union that provides a means for coupling pressurized and non-pressurized fluids between a fluid source, such as a vacuum source, which is stationary and non-rotating and a rotatable polishing head wafer carrier assembly by mounting the rotary union “to the non-rotatable portion of the polishing head” to provide “means for confining and continually coupling a pressurized or non-pressurized fluid

between a non-rotatable fluid source and a region of space adjacent to an exterior surface of the rotatable spindle shaft 119.” (See column 11, lines 11-20 in Maloney). Fig. 4 in the disclosure in Maloney specifically discloses that the non-rotatable portion of the rotary union is connected to the rotatable shaft (see column 11, lines 29-32) and that multiple passageways extend from the exterior shaft surface in the top of the shaft to hollow bores within the spindle shaft (see column 11, lines 37-40). Unlike Applicant’s claimed invention, Maloney fails to disclose mounting a rotary union to a wafer carrier or workpiece carrier.

In response to these previous arguments set out by Applicant, the Examiner contends that the rotary union of Maloney is mounted to the carrier since the rotary union is mounted to the shaft, which is in turn mounted to the carrier. The Examiner also states that “the rotary union is mounted on the carrier, since the shaft is mounted on the carrier, and the rotary union is mounted on the shaft.” The Examiner finally states that Applicant does not recite any specific structure which would define the invention over the combination of Maloney and Liu or Berman. Again, Applicant respectfully disagrees.

Applicant’s currently pending claims clearly require a rotary union to be mounted to a workpiece carrier. In Maloney, the rotary union is mounted to the shaft, not to the workpiece carrier. In fact, one of the novel elements of Applicant’s invention is the location of the rotary union which is directly mounted to the workpiece carrier. Moreover, Applicant’s specification specifically states the following: “Potential leaks and pressure drops in main pressure line 46 and main exhaust line 48 are not critical for system operation since pressure supply to chambers 34 is controlled at carrier 32. Rotary union 42 is also used to connect electrical lines between control system 40 and control board 44. The reliability and simplicity of this connection is much higher than for pneumatic lines. Finally, the reduced number of components in system 30 and their reduced dimensions, along with a simplified design for rotary union 42, allow for a greater number of channels and pressurizable chambers in multiple carrier 32, which in turn improve process performance of carrier 32.” (See Applicant’s specification, paragraph 0028).

Further with regard to claim 17, the Examiner has again relied on the combination of Liu and Maloney and further stated that a pressure control system comprising at least one pressure transducer (29) is disclosed in Liu. Applicant respectfully disagrees that this disclosure further

supports the combination of Liu and Maloney to arrive at Applicant's claims.

Liu describes a carrier in which the pressure on the wafer is applied by actuators with moving parts which are located on the workpiece carrier. In contrast, Applicant's invention does not utilize mechanically moving parts to apply pressure but instead applies pressure through air inflation of pressurizable zones. Inlet valves 35 and exhaust valves 37 are utilized to control the pressure flow and pressure transducers 38 are coupled with the inlet valves and exhaust valves in order to control the inlet valves and exhaust valves. (See Applicant's specification, paragraph 0026). Therefore, the actuators used in Liu to provide downward force on the wafer would not have made it obvious to one of ordinary skill in the art to combine the teachings of Liu with the rotary union of Maloney to arrive at Applicant's claims.

Claims 15, 17 and 19-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Berman et al., U.S. Publication No. 2003/0211811 (hereafter "Berman") in view of Maloney as applied in the Examiner's rejection filed November 27, 2006. In that rejection, the Examiner stated that Berman discloses "a workpiece carrier comprising; inherently a carrier housing, a workpiece bladder (14) coupled to the housing, the workpiece bladder having a surface configured to press against a surface of a workpiece; and at least one pressure transducer (20) mounted to the carrier housing for controlling pressure provided to the workpiece bladder. See Fig. 1, paragraphs 20, 25, 26 and 28." Although the Examiner concedes that Liu (we suspect the Examiner means Berman here) fails to disclose a rotary union for connecting electrical lines, an air supply line, and an air exhaust line to the pressure control system, the Examiner argues that Maloney discloses that it is well known in the art to provide a rotary union mounted to a workpiece carrier for communicating stationary supply sources/lines external to the carrier with the carrier in locations on the carrier by allowing the sources/lines to pass therethrough. Accordingly, the Examiner contends it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Berman apparatus by providing a rotary union mounted to the workpiece carrier for connecting electrical lines, an air supply line, and an air exhaust line to the pressure control system by allowing the lines to pass therethrough as taught by Maloney. Applicant respectfully disagrees.

Berman discloses a substrate carrier having a deformable surface for receiving a substrate

and addressable transducers which apply pressure to pressurizable application zones. A controller can control the amount of force that the addressable transducers press with. (See paragraph 0032 of Berman). In contrast, Maloney uses a completely different force to exert pressure on the workpiece. Instead, Maloney utilizes pressurized pneumatic fluids to apply pressure to pressurizable zones. Therefore, it would not have been obvious to one of ordinary skill in the art to combine the transducers disclosed in Berman with the apparatus disclosed in Liu to arrive at Applicant's claimed invention.

Moreover, as previously argued, Maloney fails to disclose a rotary union mounted to a workpiece carrier or wafer carrier. Instead, Maloney discloses connecting a rotary union to a spindle shaft of a polishing head to provide multiple passageways for pressurized and non-pressurized fluids. Berman also fails to disclose a rotary union mounted to a wafer carrier to connect one or more pressure transducers with a control board. Instead, Berman discloses the preferable use of digitally selectable addressable transducers by stating the following: "One reason why it is preferred that the addressable transducers 18 be digitally selectable is so that few lines 22 are required to individually select the addressable transducers 18 and thus the lines 22 do not require much room in the arm 36. This is beneficial because it is desirable to not increase the size of the arm 36 to accommodate a large bundle of lines 22 and also because the substrate carrier 12 preferably rotates on the end of the arm 36, and connection for many lines 22 through the rotating connections would be expensive and complicated." (See Berman, paragraph 0027). Accordingly, in that neither Berman or Maloney discloses each and every element of Applicant's claimed invention, namely a rotary union mounted to a wafer carrier or workpiece carrier. Applicant's claimed invention cannot be obvious in view of Berman and Maloney.

Claim 16 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Liu or Berman, each considered independently, in view of Berman and Zias et al., U.S. Patent No. 4,051,712, as applied in the Examiner's rejection filed November 27, 2006. In that rejection, the Examiner relied on his previously explained disclosures of Liu and Berman. The Examiner then conceded that although Neither Liu nor Berman disclosed an automatic calibration system for calibrating at least one pressure transducer, the Zias reference discloses that it is well known in the art to automatically calibrate a pressure transducer in order to maintain a desired pressure level. Therefore, the Examiner contended that it would have been obvious to one of ordinary

skill in the art at the time the invention was made to have modified both the Liu and Berman apparatuses, each considered independently, by providing an automatic calibration system for automatically calibrating at least one pressure transducer as taught by Zias in order to maintain desired pressure levels in the apparatus. Applicant respectfully disagrees.

As previously argued above, Applicant contends that neither Liu nor Berman disclose a rotary union mounted to a workpiece carrier. In addition, Zias also fails to disclose this element. Therefore, it could not have been obvious to one of ordinary skill in the art to arrive at Applicant's claim 16, which requires this limitation, in view of Liu and Zias or Berman and Zias.

Claims 18 and 22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Liu in view of Maloney and further in view of Muller et al., U.S. Patent No. 5,980,361 (hereafter "Muller") as claims 3 and 9 which were rejected in the Examiner's rejection filed November 27, 2006. In that rejection, the Examiner relied on his previously explained disclosure of Liu. The Examiner then conceded that although Liu does not disclose at least one valve for the control system, Muller discloses control valves for independently operating pressure chambers in a workpiece carrier for individually actuating different areas of a support plate. Therefore, the Examiner contended that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Liu apparatus by providing control valves for independently operating each of the actuators as taught by Muller for better control of the apparatus. Applicant respectfully traverses this rejection.


As previously argued above, the Liu reference fails to disclose a rotary union mounted to a workpiece carrier. In addition, Muller also fails to disclose this limitation which is required by Applicants' claims 18 and 22. Accordingly, it could not have been obvious to one of ordinary skill in the art to arrive at Applicant's claims in that neither Liu or Muller, either alone or in combination, disclose each and every element of Applicant's claimed invention.

In view of the foregoing, Applicant respectfully submits that all of the pending claims fully comply with 35 U.S.C. §112 and are allowable over the prior art of record. Reconsideration of the application and allowance of all pending claims is earnestly solicited. Should the Examiner wish to discuss any of the above in greater detail or deem that further amendments should be made to improve the form of the claims, then the Examiner is invited to telephone the

undersigned at the Examiner's convenience. Applicant authorizes and respectfully requests that any fees due be charged to Deposit Account No. 19-2814. **This statement does NOT authorize charge of the issue fee.**

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Respectfully submitted,

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